A+ CORE 1

1001

Started

2/12/21

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- 90 questions, 90 minutes, 675 passing score, 2 exams

1.1 Mobile Devices

Hard Drives:

- SSD: lower temps, small power cons., no moving, no noise, .1 ms acess time, .5% failure rate, less storage, more $$
- HDD: hot, high power, moving parts, more noise, 5.5-3.0ms, 2-5% failure, more storage, cheaper
- non-volitile

Memory (RAM):

- volitile
- very fast

Mini PCIe

- how older laptops connect
- video, cellular & wifi cards connect through mini pcie connectors

DC Jack

- Where power comes from for motherboard

Batteries

- Nickel cadmium (NiCd)
- Lithium-ion (Li-ion)
- Nickel-metal Hydride (NiMH)

1.2 Display of Laptop

Types of Displays:
- LCD vs. OLED
- -LCD - liquid crystal display
  - light, thin, backlight, bright
- -OLED - organic light emitting diodes
  - light, thin, diode supplies light, contrast

Wifi atenna (internal cards)
- located around the screens

Inverter
- Component for LCD lighting, takes DC and inverts it to AC for backlight.
- Cause for flickers or dimming

1.3 Laptop Features

- if youre not using bluetooth, turn it off
- Dual displays, wireless/cellular on/off, volume settings, screen brightness, blutooth/touchpad/GPS on/off, keyboard backlighting, screen orientation, media, airplane mode, docking stations, port replicator, cable lock, rotating/removable screen,

1.4 Mobile Devices

Tablets:
- portable, good battery, no high processing, touch screen

Smartphones:
- portable, common, good battery, less powerful than laptop, small screen, good resolution

Wearable devices:
- popular, smart watch, small task w/ little processing

E-Readers:
- Kindle fire, losing popularity, low preformance

GPS
- losing popularity, low preformance

1.5 Ports of Mobile Devices

- Connection Types
  - Wired
  - USB / Micro-USB / Mini-USB / USB-C

  - Tethering
  - Connecting a device to another system
  - Vender specific ports
  - Iphone, Samsung (tesla charger)
  - NFC
  - Wireless connectivity
  - Bluetooth
  - better range than NFC, 30-100 ft
  - IR infrared
  - line of sight to see
  - Hotspot
  - Share connection

1.6 Network Connectivity

POP3 port: US:110, S:995

- Post office protocol
  - Set of rules that **store and retrieve your emails from a server to the client**
- Only **1 device** connectivity - contrast to IMAP
- Port, Server information, authentication

IMAP US:143 S:993

- internet message access protocol
  - Set of rules that **store and retrieve your emails from a server to the client**
- **folder creation** on server, **multiple devices** can retrieve information
- Port, Server information, authentication

Port and SSL Settings

- Ports are like **doors into/out of system**
  - path of clients and servers to communicate
- **Socket - IP + Port** (192.168.10 22:3389)
- Secure socket layer (SSL) use for **secure comm.** between **client & server** (TLS)
- diff settings use different ports for clients

S/MIME

- Secure/multipurpose internet mail extensions
  - digitally signed & encrypted messages

PRI & PRL Updates / Baseband updates

- PRI updates - Product release instruction
  - -Settings for config. items on device specific to the network its on
- PRL updates - Preferred roaming list
  - -Connect proper cell phone tower while roaming
- Baseband updates
  - -update of the "sub os" that manages wireless comm.

Radio Firmware

- Firmware is special instructions for hardware
- update security. not "os" updates

IMEI vs. IMSI

- IMEI of all mobile stations are stored in db known as EIR (equipment identification register)
- IMSI number to mobile user by telecom serv. provider or carrier - stored in Sim card

VPN

- Virtual private network
  - using public internet as transmission media but secure

1.7 Synchronization

Sync to cloud
- popular, photos contacts music emails being updated

Sync to desktop
- issues w/ cloud, copies are local, wired / wireless connection

Sync to automobile
- bluetooth to sync contacts

Mutual authentication for multiple services
- Single sign on SSO
- provide credentials once, info shared across network

Software requirements to install Apps
- Software requirements for the apps w/ PC sync.
- Storage space usually problem

Connection types to enable Sync
- tethering, wired vs. wireless

quiz:
- function keys = letter keys, non-volitile = HDD, GPS = global positioning system

2.1 Networking

TCP & UDP ports, protocols

FTP File transfer protocol
- Used to move local files to server
- Port 20 (data) 21 (connection), unsecure, TCP

SSH Secure shell
- Secure replacement for unsecure Telnet
- remote connections to server or networking devices
- used to secure other proto. FTP, SCP
- port 22, TCP

Telnet
- unsecure plain text
- Used to make remote conn. to Telnet server or networking device
- Port 23, TCP

SMTP Simple mail transfer protocol
- Sends email for you, responsible for sending to diff email servers
- TCP, Port 25

DNS Domain name server
- Used to resolve hostname to IP address - MX, SOA, SRV, PTR
- Port 53, TCP & UDP

HTTP hypertext transfer protocol
- Used to surf web
- Port 80, TCP

POP3
- retrieve emails, 1 device (cut not copy)
- Port 110, TCP

IMAP internet message access protocol
- retrieve emails, leaves copy on server
- port 143, TCP

HTTPS HTTPsecure
- Https using Secure protocol like SSL or TLS to encrypt
- port 443, TCP

RDP remote desktop protocol
- used to remote connect to server or desktop
  - not like Telnet which is command line, this gives gui
- port 3389, TCP

NetBIOS/NetBT Net basic input output service
- used to talk over LAN, used in Windows for file/printer share.
- providing services rel. session layer OSI model, allow apps on seperate comp. to talk over LAN
- Port 137 (UDP) 139(TCP)

SMB/CIFS Server message blocks/common internet FS
- Client-server comm. protocol for sharing access files printers, serial ports, etc. on network
- port 445, TCP
- CIFS part of SMB where MS tried supporting other OS

SLP Service location protocol
- allows devices to find services in LAN w/o config
- have to have URL, 427

AFP Apple filing protocol
- file services for macos
- 548, TCP

DHCP dynamic host config. protocol
- provides IP host w/ IP address & subnet & gateway etc.
- port 67 server end, 68 client end, UDP

LDAP lightweight directory access protocol
- Client-server for accessing directory services
  - active directory, place to store username & password
- Port 389, TCP

SNMP Simple network management protocol
- collect & organize info managed devices on IP net for modifying to change device behavior
- Port 161 (get) 162 (trap), TCP

TCP vs. UDP
- Transmission Control Protocol vs. User Datagram Protocol

TCP: reliable, 3 way handshake (SYN > SYN/ACK > ACK)
4-way shutdown process (FIN > ACK > FIN > ACK)
larger header than UDP

UDP: unreliable, send it and forget it, good for streaming, no error correction

Port # to note
SSH → 22
rdp → 3389
Https → 443

2.2 Network Hardware Devices

Routers
- Layer 3 on OSI model - based off IP addressing IPv4 IPv6
- moving data from one network to another network
- creates tables for moving data from interface to interface

Switches
- Layer 2 - based off hardware addressing
- extends network and broadcast network
- managed - network admins to config port, sec, VLAN. IP remote manage
- unmanaged - called hub, no decisions

Access Point
- devices to connect to wireless network
- SoHo users usually have access point/wireless router

Cloud Based Network Controller
- network more software based
- Software defined net. manipulates data planes
- Cloud based for centralized control using soft.

Firewall
- filters traffic coming in/out your network
- operate based on addressing, content or context
- host based protects 1 system, network protects all

Network Interface Card
- NIC allow devices connect to network
- MAC address, hard coded on card

Repeater
- anything that can pass a signal and regen the signal

Hub
- layer 1, has no place
- works as a repeater

Cable/DSL Modem
- take signal from ISP and convert to usable signal in your home

Bridge
- tiny switch, 2-4 ports
- cut down LAN collisions

Patch Panel

- located in comm. closet & data center

Power over Ethernet
- deploy WAP around building w/o power outlets
- power pused through cabling

Ethernet over Power
- kinda opposite of PoE

2.3 Wired/Wireless SOHO Network

Router/Switch Functionality
- layer 3, up IP addressing, router
- switch layer 2, MAC addressing
- most SOHO are router/switch/AP together

Firewall
DMZ Demilitarized Zone
- zone between unprotected internet and trust network on inside
- put public facing service in DMZ

Port Forwarding
- run services in SOHO but dont have public IP to the device
- if you want to run web server in your home

NAT Network Address Translation
- takes private IP addressing and translates to Public
- Static NAT (1/1 private IP/public IP), Dynamic NAT (Pool of IP, 2/1 Priv/Pub)
  NAT overload (1 public, many private)

QoS Quality of Service
- whose traffic gets to flow, prioritization

Wireless Settings
Wireless Encryption
- WEP - Wired Equivalent Privacy
  - not secure, uses same key over
- WPA - Wifi Protected Access
  - rotates/changes keys, better than WEP
- WPA2 - best we have
  - Aes encryption compared RC4
  - very secure

2.4 Wireless Networking Protocols

802.11

- a) 5GHz, 23 non-overlapping 20MHz, up to 54 Mbps
- b) 2.4 GHz, 3 non-overlapping, 11 Mbps
- g) 2.4 GHz, 3 non, 54 Mbps
- n) 2.4 GHz & 5 GHz, Multiple input/output, 150 Mbps / 40 MHz
- ac) 5 GHz, Gigabit Ethernet, 80 or 160 MHz, 8 spatial Stream

Frequencies

- 2.4 GHz, more congested, flatter go farther
- 5.0 GHz, faster data

Channels

- 2.4 = 11 channels, 3 dont overlap
- 5.0 = 23 non overlapping

Bluetooth

- 2.4 GHz, 79 channels used

RFID Radio Frequency ID

- electromagnetic fields to identify tags

Zigbee & Z-wave

- Mesh network, everybody is connected

3G, 4G, 5G, LTE

- LTE = 1Gbps but 5G = 10 Gbps

2.5 Services by Network Hosts

Server Roles:

Web server
- host website pages, not powerful
- layer hierarchy - web server > web app server > database serv
- Apache Linux #1

File Server
- Computers with lots of storage
- Support multiple protocols SMB, FTP, SCP, WebDav

Print Server
- help with pressure of print jobs with prioritization

DHCP Server
- give IP add. info to clients (IP, gateway, DNS, WINS, lease time)
- Server admin defines scope (range, reserve time)

DNS Server
- Contact list for internet

Proxy Server
- Works on somethings behalf
- Used to hide back comp. from public
- Cache internet info locally
- filter out bad web

Mail Server
- folders or mailboxes for each other
- acc name associated w/ domain
- Protocols have diff roles

Authentication Server

- prove you are who you say you are
- auth. in local or centralized area
- Radius, SSO, Kerberos (authenticator)

Syslog

- network devices & server systems have log files
- logs to be aggregated into one location (helps w/ searching)

Internet Appliances:

UTM Unified Threat Management

- one stop shop for security
  - firewall, app control, reporting, anti-malware, VPN, Anti-spam, IDS/IPS
- protects SOHO

IDS Intrusion Detection System

- device or server that filters traffic
- Signiture based, anomaly based, heuristic based, host/network based
- alerts admin to take action

IPS Intrusion Prevention System

- IDS but takes action

End Point Management Server

- Centrally discover, provision, deploy, update and trouble shoot endpoint devices
- track assets

Legacy/Embedded Systems

- outdated, runs Hvac or sprinkler
- proprietary and expensive to replace, replace entire section just for embedded device

2.6 Network Config.

IP Addressing

- where routing takes place

Static IP: what a user manually puts in, IP stays same

Dynamic IP: addresses can change

- IPV4 more common, IPV6 still a thing
  - ↳ 32 bit numbers in dotted decimal
- layer 3, A-E classes, Private range 10.0.0.0 - 10.255.255.255, 172.16.0.0 - 172.31.255.255, 192.168.0.0 - 192.168.255.255

APIPA automatic private IP addressing
- windows add.
- cant surf internet

Link Local IPV6 term (fe80::)
- only valid for LAN, cant pass over router

DNS host records

IPV4 vs. IPV6

32 bit	128 bit
all #	hexadecimal (A-F, 0-9)
4 OCtets	8 hextets
4.3 bil add.	3.4×10^{38} add

Subnet Mask

- Covering up network portion of IP
- Used to determine network, broadcast & usable range for an IP address

Gateway

- the way in/out of your network, usually a firewall

VPN

- use to get back to work/home network
- surf securly

VLAN virtual local area network
- used all over
- logically break up networks but use same physical equipment
- layer 2 switches, layer 3 device to route

NAT network address translation
- private IP mapped to public IP

2.7 Internet connection & network types

Cable Internet
- most popular, coaxial cable, very fast 1Gbps, $ not bad

DSL Digital Subscriber Line
- not as popular, not that fast

Dial up internet
- very slow, good for small data packets

Fiber
- growing popular, very fast, ISP install converter

Satelite
- very rural, very expensive, decent speeds

ISDN integrated services digital network
- slow, not popular

Line of Sight wireless
- microwave comm.

Network types:

LAN
- your private network, small area

WAN
- Connect LAN's together, miles long

PAN
- small network, bluetooth

MAN
- LAN & WAN together, blanket city w/ internet

WMN wireless mesh network
- radio nodes organized in mesh topology, goes from node to node

2.8 Networking Tools

Crimper · attach ends to network cables

Cable Stripper · remove protective covering on cable

Multimeter · test line to see if power flowing

Tone generator & probe · to see which ends of the cable goes to which

Cable tester · after you make a cable, see if it works

loopback plug · hardware test for NIC

punchdown tool · punchdown cable into connection slots

Wifi analyzer · want to see how many wifi networks are around

3.1 Cables

Network Cables:

Ethernet 802.3

- Cat 5 - twisted, 4 wires, 100Mbps, 300ft
- Cat5e - twisted, 4, 1Gbps, Crosstalk, 300ft
- Cat 6 - twisted, 4, 10Gbps, 300ft
- Plenum - plastics that dont give off chem when burn
- Sheilded vs unsheilded
- 568 A/B - standard for making cables

Fiber

- fastest, not copper but light waves

Coaxial

- Copper wire

Video Cables:

VGA video graphics array

- 15 pin connector
- analog video display

HDMI & mini HDMI high def. multimedia interface

- video & audio signals
- replaces analog VGA

Display Port

- One port can support multiple monitors
- digital audio & Video signals

DVI digital visual interface

- Video only, digital

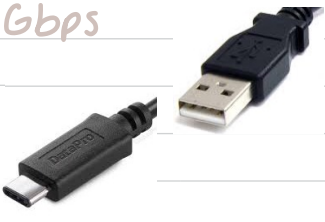
DVI-D - digital only DVI-I - digital & analog

Multipurpose Cable:

lightning cable
- Apple phone connector

thunderbolt
- Connect thunderbolt devices to system
- thunderbolt 1 & 2, same connector as mini Display port
  thunderbolt 3 uses USB-C

USB
- used for peripherials, carries data, audio, Power
- 1.0 = 12 Mbps, 2.0 = 480 Mbps, 3.2 = 20 Gbps



USB-C
- upto date USB, very fast 20Gbps

Peripheral Cables
- Serial cables, old

Hard Drive Cables:

SATA Serial advanced tech. attatchment
- replaced PATA (parallel ATA)
- fast, 2 GBps

IDE integrated drive electronics
- PATA
- 133 MBps, multiple devices on one cable

SCSI Small Computer System interface
- device to device for external HD

Adapters
- allows tech to convert to other tech

3.2 Common Con. types

Connector

RJ-11
- Telephone, older 2pairs, 4wires

RJ-45
- Connectors on the end, 4pairs, 8wires, CAT5, 5e, 6, Ethernet

RS-232
- Old connector for serial cables

BNC
- mini quick connect/disconnect radio frequencies

RG-59 /RG-6
- low power video
- tv, tightener

DB-9
- Serial cable, 9 pin, EIA/TIA 232 serial intf.

esata
- external SATA, hard drives

Molex
- how internal devices get their power (old)

3.3 RAM Types

RAM Types:

SODIMM small outline dual in-line memory mod.
- used for laptops
- small notch & half circle markings

DDR 2/3/4 double data rate
- pins dont match up
- SODIMM sizes 2=200pin 3=204pin 4=260pin
- DIMM sizes 2=240 3=240 4=288
- peak transfer rate 2=2100 MB/s 3=2600 MB/s 4=3200 MB/s

Single/Dual/Triple channel
- how many chips youre using
- motherboard/CPU thing, not RAM thing

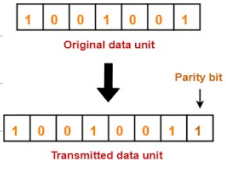
Error correcting
- correct data corruption
- has parity bit

Parity vs non-parity
- Parity is an extra bit added to recognize errors
- only detect, not correct
- non-parity faster

SO-DIMM

DDR slots

1/2/3 channel



Parity bit

3.4 Storage Devices

Optical Drives
- light, lasers, no touching or magnetics
- faster, more capacity, CD, DVD, Blue-Ray
- double sided & double layered

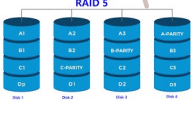
Solid-State Drives
- no moving parts, quiet, fast
- NVMe - non volatile memory express
  - high speeds, push in like RAM

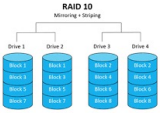
Magnetic Hard Drive
- Hard disk drive, moving parts, cheaper
  - 2.5in & 3.5in (new & old)

Hybrid Drives
- speed of SSD, capacity of HDD

Flash Drives
- flash memory very fast
- SD card, Compact flash, XD
  - Secure digital, non-volitile memory, portable devices
  - Compact flash mass portable storage, not as popular
  - extreme digital, digital photography, not relevant

Configurations
- Operate drives in different modes
  - Raid 0, 1, 5, 10
- Raid 0 - Striping, preformance gain no fault tolerance
- Raid 1 - mirroring, exact data on disk 1 & 2. fault tolerance
- Raid 5 - Striping w/ parity, min 3drives, preformance & fault
- Raid 10 - mirroring w/ Striping





3.5 Motherboards, CPU's, Add on Cards

Motherboard Form factors:

ATX advanced technology extended
- Standard motherboard 12" x 9.6"

mATX microATX
- 9.6 x 9.6, less expansion slot, smaller

ITX & mITX information tech. extended
- smaller than mATx, Cars, Pi's

Motherboard Connector Types:

PCI peripheral component interconnect slot
- expansion slot like sound/video cards

PCIe PCI express
- Smaller, # after x is how many lanes (1bit p cycle)

Riser Card
- if you dont have room for expansion cards, plugs into board

Socket types
- Land Grid Array - pins on socket
- Pin Grid Array - pins on chip
- Ball Grid Array - not a socket, permanent

SATA Serial advanced tech att.
- Connect esata cables for drives

IDE integrated drive electronics
- Slower, older tech (PATA)

Front Panel Connector
- plug in on front of case

Internal USB connector
- Signal from motherboard to FP

BIOS/UEFI Settings:

basic input/output settings/unified extensible firmware interface

Boot Options

- when you first turn on, boot process begins
- Starts POST test, then finds OS and load to RAM
- diff boot options allow you to boot into diff OS
- uefi more user friendly

Firmware Updates

- update from vender to update hardware
- update on ROM chips for sec.

Security Settings

- password to protect from BIOS

Interface Configurations

- Config UEFI firmware settings
- bitlocker, secure boot, boot config

CMOS Battery

- keeps power to mb that need power all time
  - resets UEFI settings

CPU Features:

Single-core

- smaller systems, microprocessor w/ single core chip

multi-core

- multiple cores process simultaniously
- dual core has 2 CPU, could run 2 processes at same time

Virtualization

- Virtual version of something, guest OS
- turn on in Bios/uefi sett.

Hyperthreading
- "trick" OS to think it has more cores than it does

Speeds
- processor preformance in MHz or GHz
- how many times internal clock inside CPU ticks in cycles per second

Over clocking
- inside BIOS settings, tell computer to run faster
- careful of CPU temp & voltage

Integrated GPU
- integrated into the motherboard as part of chipset
- shares memory with CPU, more economical alt. to ded. GPU

Compatability
- AMD - advanced micro devices, cheaper easier to ov clock
- Intel - power, graphics, processing speed & power better

Cooling Mechanism:
Fans, Heatsink, thermal paste
- CPU get hot, thermal paste then heatsink then fan

Liquid
- Tubing with cooling liquid runs across CPU, no fans on CPU

Expansion Cards:
Video card
- display on screen, HDMI VGA DVI S-video RCA

Sound Card
- to get sound, analog digital fiber optics

duh
- Software
  firmware

NIC
- need more ports

USB expansion card
- give you more USB slots

eSATA card
- external SATA connection for drive

3.6 Peripheral Types

Monitor
- works in conjunction w/ graphics card

Optical Drive Types
- read & create disks

External Storage Drive
- backups, media storage

KVM
- Keyboard, Video, mouse. Monitor, use, config diff systems using the same peripherals

3.7 Power Supply

Input 115V vs. 220V
- need to know whats coming from your wall
- 115 V is usually in US, if 220 it might fry your circuits

Output 5V vs. 12V
- need power but not 115V
- AC → DC (→AC for monitor)

24-Pin motherboard adapter
- ATX 24 pin power supply is standard
- may need adapter (like 20pin ↔ 24 pin)

Wattage Rate
- advertised on wattage. ↑#, ↑power. May need more or less
- * more devices, more power (expansion cards, fans, higher GPU, CPU)

3.8 Custom PC Config.

Graphic/CAD/CAM Design workstation:
SSD - fast storage, 1-2 TB
High-end video - great video cards
Maximum RAM - 32-64 GB

Audio/video Editing workstation:
Specialized audio & video card - audio channels
large, fast HD - SSD or cloud based
Dual monitors - split content
more Ram

Virtualization Workstation:

Plenty of RAM, HD, CPU cores - able to run almost 2 computers

Gaming PC:

SSD - load games quickly & efficiently
dedicated GPU - the most you can afford
HD sound card - good sound quality
good cooling - lots of fans or liquid cooling

Network Attatched Storage (NAS):

- provide extra storage

tons of Drive space - HDD, RAID
NIC card - lots of input & output

Thick Client:

- everything ran on this system (PC)
- at least reccomended components

Thin Client:

- processing done at central, server based comp.
- Output just delivered to thin client
- bare components, fast network

3.9 Common Devices

Desktop:

thin client
- processing running on backend over network

thick client
- most personal computers, processed locally

Laptop/common mobile devices:

Touchscreen config - control panel > Tablet PC settings
Synchronization sett. - Cloud based app

3.10 SOHO Devices

Use appropriate drivers for given OS
- half/full duplex, listen or talk vs. listen and talk
- Collate - the printed order

Device sharing
- printers wired/wireless
- integrated print server
- Cloud printing

3.11 Print Technologies

Laser Printer:

imaging drum - transfers image w/ toner onto paper
fuser assembly - heated rollers that fuses the toner to paper
transfer belt - in front of toner carts
transfer roller - transfers the paper through
Seperation pad - Seperates the top paper
duplex assembly - print on front & back
Process - Clean, neg charge to drum, drum struck by laser, toner on img
transfer w/ pos chrg, fusing, heat & pressure to toner
maintenance - replace toner, Clean w/ gloves & brushes

Inkjet Printer:

ink cartridge - holds ink, Print head talks to printer
print head - nozzle to spray ink, heated
roller - pulls paper from tray
feeder - feeds paper in
duplexing assembly - print on both sides
Carriage - where ink carts are held
belt - attatch to cart to move
maintenance - clean heads q-tip w/ water, replace cart, clear jam

Thermal Printer:

thermochromic paper - special heat sensitive paper coated w/ chem
feed assembly - grabs paper
heating element - makes image w/ heat
maintenance - replace paper, change heating elements, remove debris

Impact Printer:

print head - part makes contact w/ paper
ribbon - ink ribbon between head & paper
tractor feed - wheels paper stays on
impact printer - holes on edges
maintenance - replace: ribbon, print head, paper

Virtual Printer:

digital copy - file, pdf, xps, img

3D Printer:

melt plastic to make 3D image

Quiz ?s: Single mode fiber = faster & farther
molex = power to older internal devices
Shift + restart = UEFI menu
Sep. pad = only top paper to be fed

4.1 Virtualization

Common Cloud Models:

IAAS

- infrastructure as a service, you buy a new PC
- you take care of OS but not hardware

SAAS

- Software as a service, you dont have to take care of anything. paying you to use cloud services

PAAS

- Platform as a service, dont take care of hardware but you use to test application

Cloud Models:

Public cloud

- low IT overhead ∞ scalability, lack of customization, potential latency

Private cloud

- fully custom, high sec., good preformance, capitol cost, high IT overhead

Hybrid cloud

- great flexability, no capac., hard compatability :, manage sec.

Shared Resources:
- w/ cloud computing, on backend the clients use · shared physical resources
- internal vs. external

Rapid Elasticity
- if you need more space w/ cloud computing (more RAM, mem., CPU) you put in request

On-Demand
- "demand" more or less of something

Resource pooling
- centralized mem, CPU, etc divided up

Measured Services
- provider needs to know how they'll charge for service

Metered
- allow customers to customize virtualization

Off-Site email applications
- off-site, cloud computing
- easier to sync, access through web, not app

Cloud file storage service
- SaaS, sync apps (g lone drive dropbox)
- cloud based, on cloud server

Virtual Application Streaming
- the bits arent on PC until tried to use it
- break package into chunks and download specific
- doesnt take hard space

Cloud based applications
- open web browser to access
- like thin client, app from cloud
- servers on backend store process all data

Virtual Desktop
- doesnt run directly on endpoint hardware
  Kinda like remote desktop

Virtual NIC
- Virtual switch, shoving info through nic

4.2 Client-Side Virtualization

Purpose of Virtual Machine
- testing, malware analysis, lab enviro., Cons. of resources, new OS, Older software, Software develop.

Resource Requirements
- guest OS requirements as well as host requirements.

Emulator Requirements
- tricking OS into thinking youre running hardware when its really an emulator software
- Virtualization uses hardware directly

Security Requirements
- physical security - who has physical access?
- network - where does traffic go?
- app - who can use what apps
- can guest os see each other?

Network Requirements
- Server or Client? how many guest os? what services are vm running?
  (type 1 HV / type 2 HV)

Hypervisor
- hosting multiple machines? Consolidate resources
- Type 1 hypervisor (bare bones, hardware, HV, guest OS)
- Type 2 hypervisor (OS in between, hw-host os-Hv-guest os)

5.1 methology w/ problems

1. identify the problem
2. establish theory of probable cause
3. test theory to determine cause
4. establish plan of action to resolve prob & impliment solution
5. verify full system functionality & preventive measures
6. document finds, actions, outcomes

1. Identify the problem

- question user, identify user changes
- enviromental or infrastructure changes, review logs

2. Establish a theory of probable cause

- question the obvious, Conduct external or internal research

3. Test the theory to determine cause

- once theory is confirmed, determine next steps
- if theory doesnt work, re-do what you did to get in og state

4. establish plan of action

- when, who is affected, how implementing

5. verify full system functionality

- test and review

6. document findings

- So you know what to do next time

5.2 troubleshoot

motherboard, CPU, RAM, Power

Unexpected Shutdowns
- power supply, overheating (CPU GPU) Malware, hardware driver (safe mode)

System lockup
- CPU temp, hardware devices, malware, updated drivers

POST code beeps
- lookup manufacture codes

Black screen on bootup
- Video cable unplugged, monitor no power/bad
- GPU bad, power bad

BIOS time & setting resets
- CMOS dead/dying

Attempt to boot to incorrect drive
- bad/missing/unplugged HD, partition isnt set, incorrect boot order

Continously Reboots
- bad/incorrect driver, malware, bad RAM, hardware issue

NO power
- Check cables/source, power supply going bad

Overheating
- dust, overclock, fans, thermal paste

Loud Noise
- hardware issue, Power supply, HD click, hitting fans

Intermittent device failure
- driver issue, became loose or unseated, power, heating

only fans getting power
- firmware
- cables, heating issues, RAM issues, GPU, bad capacitor

Indicator lights
- lights on motherboard that prompts you whats wrong

Smoke or burning smell
- Capacitor fried, Power supply, Short circuits, elec surge dirt build up

Proprietary crash screen
- blue screen of death, driver, Software thing, app frozen

Distended capacitor
- when capacitors top open, cheap or old

log entries and error messages
- Windows event viewer, linux log files (/var/log directory), Mac = Console.app

5.3 troubleshoot HD & RAID

Read/write failures
- loose cable, drive gone bad, power, malware

Slow preformance
- malware, old drives/fragmented, logic err, power, damaged drive

loud Clicking noise
- when read/write head cant write, power, data cable, bad HD drive

failure to boot, drive not recognized
- Bios settings, cable, power, boot files, drive

OS not found
- data corrupt, partition not active, OS not installed, MBR damaged

RAID not found
- BIOS incorrect, Controller fail, power, faulty drive

Proprietary crash screen
- blue screen death, MAC pinwheel

S.M.A.R.T errors
- Self-monitoring, analysis & report tech., warns you of error, error codes

5.4 Troubleshoot Video, Projector, display

VGA mode
- 640 vs. 480, bad drivers, defualt to this mode for troubleshoot

NO image on screen
- cable issue, power issue, dedicated vs. integrated

Overheat shutdown
- fans, overclock, dirt

dead pixels
- pressure on screen, dust, cracked, malfunction

Artifact
- drawing errors by video card, soft/hardware, driver overheating,

Incorrect color pattern
- Check w/ diff cables and monitors = GPU

Dim image
- settings, power, dirty projector lense,

flickering image
- refresh rate might be set low, VC driver, monitor/cable damage

destorted image/geometry
- power cable, EMF, refresh rate, Software, bad monitor

Burn-in
- ghost image, non-moving image on screen

Oversized images
- resolution, software issue/settings, display drivers

5.5 troubleshoot mobile device

no display/dim display
- power, graphics, screen damaged

flickering/distorted display
- " ", refresh rate, drivers

sticking keys
- debris in keyboard

intermitten wireless
- wireless card, bad location, cable loose

battery not charging
- battery gone bad, charger not strong,

ghost curser/pointer drift
- malware, calibration issue, bad hardware

no power
- power supply/adapter/cable, malware, bad battery

num lock indicator lights
- driver, auto come on during Boot

no wireless connectivity/bluetooth
- airplane mode, hard/software switch, wrong settings, hardware wireless card, damage screen

cant display to ext. monitor
- graphic card, Bios, bent pins, cable, Fn+F#, software

touchscreen not responsive
- calibrate, turned off, digitizer, driver, humid conditions

apps not loading
- not downloading from cloud, no perm., malware

slow preformance
- malware/bloatware, too many processes, old, physical dam.

unable to decrypt email
- Software, Key, no connection, device doesnt support encryption

Short battery
- overcharged, going bad, apps in back

frozen system
- driver, power, app, OS update, HD, RAM

no sound from speakers
- muted/turn down, driver, Software, Cable

5.6 troubleshoot printer

Streaks
- dirty, roller, head

ghost image
- humid, drivers

Creased paper
- rollers, phys. damage

paper jam
- roller/feeder, bad paper, humid

garbled characters
- bad drivers, print head

Vertical lines
- roller, head, fuser, drum

backed up que
- stalled job, memory, network

Cant install printer
- permissions, disk space

Multiple fail jobs in logs
- permissions, over quota, no paper

5.7 wired & wireless network prob

limited connectivity
- bad cables / connectors, out of wireless range

no connectivity
- perm, hardware, driver, wrong pass, cable, power

APIPA / link local
- not talking to DHCP server

intermittent connectivity
- bad cables, connectors, out of range

IP conflict
- manually put in IP but also in DHCP scope, rogue DHCP

slow transfer speed
- hub installed - makes it half duplex, cabling, wireless inf.

low RF speeds
- too far from AP, interferance

SSID not found
- typing it wrong, too far from AP or down, not broadcasting SSID

final exam wrong ?s:
LCD lighting, DC → AC = inverter
docking stations = port replicator
GPS = global positioning system
used around cities = MAN
dig transmission voice, video, data = ISDN
UEFI not eufi
transfer img = drum, heated rollers = fuser